

### **REMARKS**

The Office Action mailed November 24, 2009 ("*Office Action*") considered claims 1-19, rejecting each of the same under 35 U.S.C. § 112 over various informalities that rendered the claims indefinite. The *Office Action* also indicated that the claims would otherwise be allowable if amended to address the informalities in view of a lack of relevant teaching in the prior art. In response Applicants filed Amendment C, which Applicants believed addressed the informalities of record. Thereafter, the Examiner issued an Advisory Action on March 15, 2010 ("*Advisory Action*"), which indicated that Applicant's amendments were not entered, and that further informalities needed to be addressed.

The Examiner further telephoned Applicant's Attorney of record to discuss the same. Applicant appreciates the time taken by the Examiner to review all of the issues needed to satisfy the USPTO's standards with their Attorney, and for providing a proposed set of claim markups via email dated March 16, 2010. Applicant herewith encloses a copy of the proposed claim amendments provided by the Examiner, and discussed with Applicant's Attorney.

With this paper, Applicant herewith amends each of the claims in accordance with the proposals discussed with the Examiner. Since the amendments supplied by Amendment C were not entered by the Examiner, many of these same amendments from Amendment C appear again in this Amendment D as part of the new, replacement set of amendments. Applicant respectfully requests entry of the same as submitted herewith, and submits, therefore, that the informalities of record have been addressed. Accordingly, Applicants submit that the instant application is in condition for prompt allowance.

Finally, inasmuch as the present amendments are primarily formalistic in nature, and do not add any new claim matter not already yet considered by the Examiner, Applicant respectfully submits that no request for continued examination should be required to enter this amendment.

The Commissioner is nevertheless hereby authorized to charge payment of any of the following fees that may be applicable to this communication, or credit any overpayment, to Deposit Account No. 23-3178: (1) any filing fees required under 37 CFR § 1.16; (2) any patent application and reexamination processing fees under 37 CFR § 1.17; and/or (3) any post issuance fees under 37 CFR § 1.20. In addition, if any additional extension of time is required, which has not otherwise been requested, please consider this a petition therefor and charge any additional fees that may be required to Deposit Account No. 23-3178.

Dated this 22<sup>nd</sup> day of March, 2010.

Respectfully submitted,

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Changes to claims presented during patentability conference on March 15, 2010 which will put case into condition for allowance, **note both brackets and strikethrough are used to show deletion/cancellation of claim subject matter and punctuation marks:**

1. (Currently Amended) A process for ~~surface activation and/or~~ devulcanization of sulfur- vulcanized rubber particles comprising:  
treating one or more sulfur-vulcanized rubber particles in a medium biotechnologically with[:]  
bacteria selected from at least one of a strain of:  
(i) Desulfuromonas [T]thiophila; ~~mesophilic anaerobic bacteria;~~  
(ii) Desulfuromonas [P]palmitatis; ~~mesophilic optionally anaerobic bacteria;~~  
(iii) Sulfurospirillum [D]delevianum; ~~or mesophilic microaerophilic bacteria;~~  
(iv) Desulfuromonas acetoxidans;  
~~or~~  
~~one or more enzyme systems of a selected bacteria;~~  
wherein;  
one or more sulfur bridges are broken and an oxidation state of the sulfur is reduced; and  
the treating treatment is carried out at temperatures below 50° Celsius[:]; and  
~~wherein the treatment of rubber particles is carried out by any one or more of:~~  
(i) a microbial process; or  
(ii) an enzymatic process, wherein the enzymatic process is carried out by the enzyme system, preferably isolated by the selected bacteria; and  
wherein the treatment is carried out at temperatures below 50° Celsius.
- 2.(Currently Amended) The process as recited in claim 1, wherein the medium at least one of:  
i) ~~the a medium for treating the rubber particles~~ comprises water, nutrients, a carbon source, and the selected bacteria; or and  
ii) ~~a the~~ concentration of the rubber particles in the medium is maintained below 35 wt-%.
3. (~~Previously Presented~~ Currently Amended) The process as recited in claim 1, further comprising intermixing the medium with an agitator to

reduce at least one of the temperature ~~and/or~~ or concentration gradients.

4. (Previously Presented) The process as recited in claim 1, further comprising carrying out the treating treatment under one of anaerobic or microaerophilic conditions.

5. (Previously Presented) The process as recited in claim 1, wherein the treating treatment is carried out at temperatures within ~~an optimal~~ a temperature range ~~for mesophilic bacteria~~ of from about 33° C to about 37° C.

6. (Previously Presented) The process as recited in claim 1, wherein the treating treatment is carried out at a pH value in the region of from about 5 to about 9.

7. (Previously Presented) The process as recited in claim 1, wherein a residence time of the rubber particles in the medium is from about 4 to about 8 days.

8. (Currently Amended) The process as recited in claim 1, wherein the bacteria are ~~capable of sulfur respiration, and belong to one~~ two or more of the *Desulfuromonas thiofila*, *Desulfuromonas palmitatis*, *Sulfurospirillum deleyianum*, or *Desulfuromonas acetoxidans* bacterial strains, ~~or a mixed population thereof.~~

9. (Previously Presented) The process as recited in claim 1, wherein the rubber particles ~~to be treated~~ comprise any one or more of powdered rubber or rubber granulate, wherein the particle size of the powder or granulate is from about 0.1 mm to about 0.6 mm.

10. (Previously Presented) The process as recited in claim 1, wherein the rubber particles ~~to be treated~~ comprise ~~rubber particles made up~~ a composite of sulfur-vulcanized rubber ~~or composites thereof.~~

11. (Previously Presented) The process as recited in claim 1, wherein the rubber particles ~~to be treated~~ comprise rubber particles made of scrap rubber and/or waste

rubber, such that the process reclaims the scrap and/or waste rubber.

12. (Previously Presented) The process as recited in claim 1, wherein the rubber particles ~~to be treated~~ are produced in any one of:

- i) a comminution process, such as a peeling process;
- ii) a hot grinding process;
- iii) a cold grinding process;
- iv) a cryogenic grinding process; or
- v) a wet grinding process[;].

wherein the temperature of the rubber particles remains lower than about 90°C to thereby substantially avoid thermooxidative degradation of the rubber particles.

13. (Previously Presented) The process as recited in claim 1, wherein the surface activation and/or devulcanization is substantially restricted to the rubber particle surface and/or layers close to the surface that have a thickness of up to 300 nm, in order to substantially avoid altering the material properties of the main mass of the rubber particle material.

14. (Previously Presented) The process as recited in claim 1, wherein the ~~treatment~~ treating of the rubber particles is carried out in a bioreactor.

15. (Previously Presented) The process as recited in claim 16-1, wherein the treating addition of the rubber particles to be treated into the bioreactor and/or the removal of the rubber particles to be treated from the bioreactor is carried out in any of a:

- i) continuous fashion;
- ii) quasi-continuous fashion; or
- iii) discontinuous fashion[;].

wherein, when removing the treated rubber particles from the bioreactor, substantially no amount of bacteria and/or medium containing enzymes for treating the rubber particles is discharged therewith or comes into contact with atmospheric oxygen, such as by sedimentation of the rubber particle material and its subsequent removal under anaerobic conditions.

16. (Previously Presented) The process as recited in claim 1, wherein:  
i) any sulfur bridges contained in the rubber particles are at least partially broken by the treatment; and  
ii) the sulfur is transferred into one or more gas-forming reaction products that is during the treating hydrogen sulfide is produced, and is at least quasi-continuously removed from the gas phase to avoid inhibition and/or toxification of the bacteria[.]  
wherein the gas-forming reaction products comprise hydrogen sulfide.

17. (Previously Presented) The process as recited in claim 1, further comprising:  
~~after treating~~ washing the ~~treated~~ rubber particles with water ~~after treatment~~ to reduce salt loading; and  
subsequently drying the washed, ~~treated~~ rubber particles at temperatures below 90° C.

18. (Previously Presented) The process as recited in claim 1, further comprising using the rubber particles that are surface activated by means of the treatment to manufacture:

i) rubber products that are produced only from the treated surface activated

rubber particles; or

ii) rubber products that are produced from the treated surface activated rubber

particles and admixed virgin rubber.

19. (Previously Presented) The process as recited in claim 1, further comprising using the rubber particles that are surface activated by means of the treatment to manufacture elastomer alloys, wherein the elastomer alloys are produced by phase coupling with plastics selected from the group consisting of Polypropylene (PP) and Polyurethane (PU).

**NOTE:**

These are all of the changes, including the ones submitted in your after final amdt (which was not entered at that time) but with all the changes in the above draft submitted in the form of a supplemental amendment will be entered and the case processed for allowance.